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RECOMMENDED RECOVERY ACTIONS FOR THE HAWAIIAN MONK SEAL POPULATION AT MIDWAY ISLAND

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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INTRODUCTION

Recovery of the endangered Hawaiian monk seal (*Monachus schauinslandi)* in the western island populations of the Hawaiian Archipelago has been a primary concern of the Hawaiian Monk Seal Recovery Team (HMSRT, Gilmartin, 1983). Midway Islands (Fig. 1) is the site of the most depleted monk seal population. Because of continuing Navy operations at Midway in the early 1980s, it was not practical to include Sand Island at Midway in the designation of critical habitat for the species. For the same reason, the HMSRT did not recommend specific recovery efforts at Midway in the Recovery Plan. With the recent closure of the Midway Naval Air Facility, establishment of the Midway Atoll National Wildlife Refuge (Refuge), and transfer of the atoll to the U.S. Fish and Wildlife Service (USFWS) in June 1997, planning to recover this endangered seal population must now begin.

On December 5-6, 1995, the Honolulu Laboratory of the National Marine Fisheries Service (NMFS), conducted a workshop to develop recommendations to facilitate recovery of the monk seal population at Midway. Workshop participants were presented background data on the Midway monk seal population, results of the 1992 monk seal rehabilitation and translocation to Midway, population trend data for certain Midway reef fishes, and results of the Kure Atoll monk seal recovery efforts during 1985-91 and 1993-95. The USFWS management strategy for the Refuge was also presented. The recommendations of this workshop were the basis for developing recovery actions presented in this document.

BACKGROUND

Human Disturbance and Monk Seal Population Decline

The first reliable beach counts of the endangered Hawaiian monk seal at Midway were conducted from December 1956 through May 1957. Six beach censuses during that time ranged from 22 to 56 seals with a mean count of 42 seals (Kenyon and Rice, 1959). During the 1960s and early 1970s, sharp declines in numbers of seals occurred at Midway and at two other nearby monk seal breeding locations: Kure Atoll and Pearl and Hermes Reef (Johnson et al., 1982). Beach counts at Midway declined most severely during the 1970s (Johnson et al., 1982). These changes have been primarily attributed to human disturbance of preferred pupping beaches (Kenyon, 1972), although the decline was more abrupt than might have been expected by changes in pup survival alone. During the 1960s, the decade following the first seal counts at Midway, harassment of seals on the beaches was inevitable,

because of an increasing human population that reached approximately 3,000 in the early 1970s (Kenyon, 1972). Changes in monk seal beach counts at some other locations have also been attributed to human disturbance (Gerrodette and Gilmartin, 1990).

Past Monk Seal Recovery-Related Events

During the 1970s and early 1980s, military dependents were withdrawn and the number of military personnel assigned to Midway was scaled down. By the mid-1980s, the number of military personnel and contractors at Midway had been reduced to less than 15% of the number there during the 1960-70s. Access to Spit and Eastern Islands (Fig. 1), which were unoccupied and known refuges for monk seals, was restricted in the late 1980s by the U.S. Navy as a result of negotiations with the USFWS relative to the developing refuge designation for these sites.

On Sand Island, the only occupied island during the last 2 decades, access to some beaches was restricted for security reasons. These areas, the sandy beach on the south shore and the southwest tip of the island (Fig. 1) at the west end of the aircraft runway, were the only places monk seals were regularly seen.

Similarly, monk seal abundance at Kure Atoll, 60 nmi west of Midway, declined during the 1960s and 1970s, concurrent with U.S. Coast Guard occupation of Green Island (1960-92). Green Island is believed to be the preferred seal pupping site at Kure Atoll (Kenyon, 1972; Gerrodette and Gilmartin, 1990; Westlake and Gilmartin, 1990). Unlike the Midway monk seal population, however, beach counts of seals at Kure Atoll have been increasing since the mid-1980s. This growth has been primarily caused by intensive management (Van Toorenburg et al., 1993) which has included reduction in human disturbance, protection of Kure-born female pups from predation, and annual introductions of rehabilitated yearling females collected at French Frigate Shoals (FFS) (Gerrodette and Gilmartin, 1990). This strategy involved the collection of underweight, but otherwise healthy, female pups likely to have perished at FFS, rehabilitating them on Oahu and then reintroducing them at Kure. These efforts demonstrated that rehabilitation and relocation of monk seals could be used as a recovery tool to enhance growth of monk seal populations at other sites, possibly Midway.

In 1992, the focus of monk seal recovery activities utilizing rehabilitated females shifted from Kure to Midway. Only a fraction of the Midway monk seal population at this time was known from tag identifications which included some seals that had emigrated from Kure Atoll and Pearl and Hermes Reef. Little was known about the composition of the Midway monk seal population, and no information was available on survival and migration rates.

Few births and low beach counts suggested that the reproductive capacity of this population was limited.

With the expectation that the high survival and reproductive successes with rehabilitated seals achieved at Kure Atoll could also be realized at Midway, young rehabilitated females were released at Midway during 1992 and early 1993 (Gilmartin, in prep.). While this scheme had been successful at Kure Atoll, this initial effort to introduce monk seals to Midway was a failure, with only 2 of 18 introduced seals surviving beyond 1 year after the relocations. Nine of the seals were in excellent condition and nine exhibited varying levels of poor condition at the time of release. Seals from the latter group were smaller at the time of release and the stress of transportation and acclimation to several locations during the rehabilitation process likely contributed to their poor survival. This experience suggests that a much more cautious approach is required to rehabilitate seals and successfully relocate them, and that the process, even with healthy weaned pups, may require different strategies at different release sites. Even then, other local, uncontrollable environmental factors may contribute to mortality.

Current Monk Seal Population Trends

In the early 1980s Midway monk seal births averaged fewer than one per year. Since then, an increasing trend has been noted leading to 27 births during the last 3 years (1995-97). Midway beach counts have been increasing as well during the last decade. The mean atoll beach count for the last 3 years, approximately 15 seals, is more than three times that of the late 1980s. Interestingly, compared to the other major island populations of monk seals, the Midway population has a high proportion of immigrants and migrants from Kure Atoll and Pearl and Hermes Reef. The distance from Midway to Kure Atoll and from Midway to Pearl and Hermes Reef is less than the distances between any other major breeding sites and probably accounts for the high migration rate.

Survival of young seals at Midway, however, does not appear encouraging. Although recent data are available for only a few seals and full season resighting effort only occurred during 1997, low survival rates to ages 1 and 2 may preclude recruitment from Midway births. Continued pup tagging and population monitoring efforts are necessary to determine if juvenile mortality rates will remain low.

Management of Midway

The current resident human population on Midway is approximately 160. This number includes Refuge staff and

collaborating researchers and Midway Phoenix Corporation (MPC) staff and contractors. To meet its resource management objectives, the Refuge has entered into a long-term agreement with MPC for support. MPC provides air services and other logistic support for Refuge operations, oversees facilities operations and maintenance, and coordinates a private public use program within the Refuge. Proceeds from this public use program will enable MPC to recover costs associated with Refuge logistics and operations support. Although this partnership provides a unique opportunity for Federal and private entities to benefit, some risks to the natural resources are possible. Public fishing, diving, and land-based tours have begun, but MPC has estimated that they will need 100 tourists a day to make this a financially viable venture. The Refuge will require effective compliance with regulations by MPC and its contractors to avoid impacts on the wildlife. The need to maintain strict protection for the Hawaiian monk seal (the most endangered pinniped in the United States) and other protected resources at Midway emphasizes the need for MPC to provide an environmentally friendly public use program. Without such a program, the wildlife and the success of the partnership between the Refuge and MPC could be compromised.

The number of Midway visitors and residents on Sand Island is of some concern, even though the current number of people at Midway is only a small fraction of the historic high. Disturbance to monk seals should not be a problem if human activities are carefully regulated. Even a few people could cause a significant impact to the monk seal population, especially if seals are disturbed regularly. Thus, protection of the monk seals' habitat is essential for the recovery of this endangered species at Midway.

OUTLINE OF RECOMMENDATIONS FOR MIDWAY MONK SEAL RECOVERY

The recommendations below address monk seal research and recovery actions as well as island management needs and visitor education programs. Midway's status as a monk seal breeding island where public access is allowed necessitates an emphasis on educational programs and other management activities to ensure protection of the seals and their habitat.

Priority assignment recommendations are in brackets and are rated on a scale of 1 to 3 with 1 being the highest priority.

I. Assess Monk Seal Population and Habitat Use Characteristics

A. Implement strategy to monitor status of the population.

1. Determine seasonal abundance, including age and sex composition of resident and transient components of the population. [1]

2. Continue effort to flipper- and PIT-tag entire Midway seal population. [1]

3. Estimate age-specific survival rates. [1]

4. Determine number of births and reproductive patterns of females. [1]

5. Quantify interatoll movement patterns for all age and sex classes. [1]

6. Determine spatial and temporal, and age-, seasonal-, and sex-specific hauling patterns. [1]

    i. Compare behavior and spatial/temporal hauling patterns (e.g., VHF tags) of any introduced seals with resident seals.

7. Analyze beach census data for hauling changes related to human activities (tour, aircraft, clean-up, research, etc.). [1]

8. Identify preferred pupping and nursery beaches. [1]

B. Monitor health status of the monk seal population.

1. Monitor condition of young seals (e.g., girth). [1]

2. Conduct disease survey of the seal population at Midway and at the potential donor site prior to translocating young female seals to Midway. [1]

    i. Examine/sample all debilitated seals at Midway.

3. Assess timing and potential cause(s) of pup and juvenile mortality. [1]

4. Conduct timely and complete necropsies to determine causes of death. [2]

    i. Train field biologists in complete gross necropsy and tissue sampling procedures.

5. Monitor levels of toxic substances, both natural (ciguatoxin) and anthropogenic (PCBs, DDT residues, etc.) in Midway monk seals. [2]

    i. Evaluate potential effects of concentrations found.

6. Collect and analyze condition and injury data on weaned pups and juveniles to assess factors that may be associated with mortality. [1]

7. If seals are translocated to Midway, compare health status (body condition, disease, growth, number of injuries, molt duration, etc.) between introduced and resident seals. [2]

C. Monitor monk seal prey preferences and abundance and quality of prey.

1. Identify age-, seasonal-, and sex-specific prey preferences using scats/spewings. [2]

2. Conduct annual fish (and invertebrate) survey at Midway to monitor trends in reef productivity and prey availability and compare to seal population and prey abundance trends at other island sites. [2]

D. Monitor habitat to identify direct threats to monk seals.

1. Monitor trends in monk seal injuries and describe possible causes. [1]

2. Monitor trends in seal entanglement in marine debris and hooking associated with fisheries. [1]

3. Survey beaches for any direct evidence of non-compliance (e.g., footprints) with restrictions on human beach access. [2]

i. Where appropriate, use seal hauling data to recommend adjustment of human beach use.

4. Document activities allowed at public use sites that may be detrimental to monk seals. [2]

II. Conduct Research to Guide Recovery Effort

A. Develop and implement a non-disturbing method for monitoring condition of individual seals. [3]

B. Evaluate the ability of current NMFS reef assessment protocol to predict monk seal prey resource base, utilizing recent foraging pattern data. [3]

C. Determine causes of change detected in prey availability (climate, fisheries, etc.). [3]

D. Compare prey preferences of introduced seals with resident seals using scats and spews. [3]

E. Develop long-term habitat quality monitoring program, which should include testing prey for anthropogenic pollutants. [3]

F. Develop method to monitor seal prey resource for ciguatoxin and other relevant biotoxins. [3]

G. Assess abundance and seasonal distribution of large sharks. [3]

H. Develop Midway seal population model.

1. Evaluate necessity of introducing seals using model. Project population growth with and without addition of young females. [2]

2. Estimate expected survival for seals to be relocated to Midway. [2]

3. Determine optimum abundance and sex ratio of Midway population. [3]

4. Develop criteria for determining whether seal introductions should be continued at Midway in subsequent years until population recovery goals have been achieved. [2]

I. Assess status of the seal donor population.

1. Determine if survival of the donor age group has changed. [1]

2. Regularly assess health status of the donor population. [1]

3. Evaluate possible changes in donor age group for possible skewing [1].

4. Determine if there are other higher priority candidate recipient populations. [1]

J. Evaluate status of introduced seals.

1. Determine survival rate of relocated seals at Midway. [1]

2. Assess survival of introduced seals at Midway and compare with survival of seals in the donor population. Determine acceptable lower limit. [3]

K. Compare foraging patterns of introduced seals with resident seals of the same age group using TDRs. [2]

L. Evaluate use of sonic tags for predation test on introduced seals. [3]

M. Develop criteria for recapture of moribund or ill animals for investigative work. [2]

III. Mitigate Threats to Seals and Initiate Recovery Actions

A. Remove potentially entangling debris from beaches. [1]

B. Document apparent links between human activities and seal disturbance for USFWS management action. [2]

C. Introduce young female monk seals to enhance population growth (funding commitment to monitor survival should be required). [1]

1. Identify appropriate history/condition of seals for introduction. [1]

2. Determine if rehabilitated seals (from underweight condition) *or* healthy seals (from donor site where juvenile survival is low) *or* a mix is appropriate for introduction to Midway. [1]

3. Establish translocation disease screening criteria. [1]

4. Identify translocation route and rehabilitation requirements/guidelines. [1]

i. Assess available translocation methods and evaluate potential risks to animal health.

ii. Translocate directly to Midway from donor population after disease screening criteria are met at donor site to preclude new disease introductions:

- Rehabilitation may be required (holding 6-10 months, if seals are not rehabilitated at donor site) at Midway for seals that require treatment before release.

5. Minimize number of relocations per individual, reduce time in transport, and use methods that reduce stress.

6. Develop "soft" release protocol for introducing seals and differentiate between healthy weanlings and those requiring rehabilitation. [1].

   i. Set time requirements for holding seals at Midway before release.

      - Keep veterinarian or veterinary technician at Midway during time seals are held in enclosure.

      - Inspect and repair enclosure daily.

7. Select best site for enclosure at Midway. [1]

   i. Small beach east of old seaplane ramp on north side of island (good general sea state in summer, easy access, distant from some known pollutant sources, but needs a contingency plan for periods when fuel deliveries occur).

   ii. Eastern I. site (no disturbance, distant from pollutant sources, weather-limited access).

   iii. Test sediment (for pollutant residues) and water quality (coliform bacteria) at potential sites.

8. Define criteria for size of holding enclosure and partitioning of structure. [1]

   i. Allow ample hauling space without crowding and easy observation of feeding abilities.

   ii. Sites exposed to potential high surf or the cargo pier site during fuel delivery will require option to contain seals with fencing on high beach for safety.

9. Establish feeding protocols for seals in holding enclosures. [1]

   i. Feed herring or other high-fat fish species to maintain or increase seals' weight.

   ii. Obtain locally (Midway) collected live fish and invertebrate prey species to assess seals' ability to catch and consume live prey.

10. Set release age, weight, and health criteria. [1]

11. Determine optimum time to release--spring or summer recommended; consider other Midway activities that may affect the operation. [1]

12. Develop plan to determine disposition of seals whose condition may change (affecting release possibility) while in holding for release at Midway. [1]

IV. Develop an Educational Program to Prevent Interactions Between Humans and Monk Seals

A. Conduct frequent educational presentations to Midway residents and visitors on the conservation needs of the Hawaiian monk seal and the importance of abiding by approach regulations to enhance the recovery of the species. [2]

B. Develop brochure for distribution on flights to Midway addressing the above. [3]

C. Evaluate whether public viewing of monk seals can be managed in restricted areas at Midway, under supervision if necessary, so that disturbance does not occur. [2]

CURRENT RESEARCH ACTIVITIES AT MIDWAY

In June 1997, the NMFS and Hawaii Wildlife Fund (HWF) began a cooperative population monitoring program at Midway and will maintain their research efforts continuously at least through the summer of 1999. Previous research activities at other reproductive sites have never lasted longer that 5 months.

Justification for this high level of effort is based on two critically important information needs. First, regular censuses will allow biologists to determine the timing of post-weaning mortality, and assess the condition of seals near the time of disappearance. Hopefully, such information will provide insight on the potential factors (e.g., injury, starvation) that may be contributing to juvenile mortality.

Second, continuous monitoring is necessary at Midway to identify terrestrial habitat use and determine if haulout patterns change in relationship to human activities on the islands. Also, the presence of monk seal biologists on Midway throughout the year will likely serve as a deterrent to human disturbance and further aid in the protection of seals and their habitat. Resident biologists will also conduct activities that have been identified in this recovery plan (collection of scats for food habit information, removal of marine debris from

beaches, disentanglement of seals in marine debris, collection of additional data such as sightings of transient seals from other populations, and participation in educational programs).

SUMMARY

Implementation of these recommended research and recovery actions will depend on available funding and the importance of recovery of the Midway monk seal population relative to priority recovery needs for monk seals at other sites. The recommendations above include a high number of priority 1 items. Some require immediate attention because they will influence decisions related to choice of recovery actions.

Data relative to the suspected high mortality rate of seals born at Midway must continue to be rigorously collected to document whether further research is necessary and introductions of young seals represent a viable recovery action. The time required to adequately evaluate this survival question should be estimated so that appropriate resources are allocated to data collection and analysis. A timely decision is crucial because implementation of recovery actions at Midway depend on these results. Additionally, salvaging young females from their almost certain loss at FFS is a critically important population recovery action; therefore, any expectation that their survival would be enhanced at Midway should be considered in this decision.

With the possibility of relocation of young females to Midway serving as a major recovery tool, the preliminary disease surveys of the Midway and donor seal populations should also be initiated soon. If results of the Midway survival data support a relocation recovery action, relocations could be initiated when the disease screening is completed.

The high potential for human disturbance of monk seals at Midway dictates that the population should be observed on a year-round basis. In addition to collecting monk seal population data, the presence of a monk seal biologist throughout the year would likely deter human disturbance. The presence of a biologist would also facilitate regular removal of entangling marine debris from seals and beaches and increase the frequency of educational seminars given to visitors and residents of Midway.

ACKNOWLEDGMENTS

The recommendations appearing herein were generated from several sources. The December 5-6, 1995 NMFS Midway recovery workshop in Honolulu generated an initial list of recommendations

which we edited and made available to members of the Hawaiian Monk Seal Recovery Team and Midway Atoll National Wildlife Refuge staff. Comments from these individuals were considered in developing the final text and outline of recommendations. We thank all who contributed.

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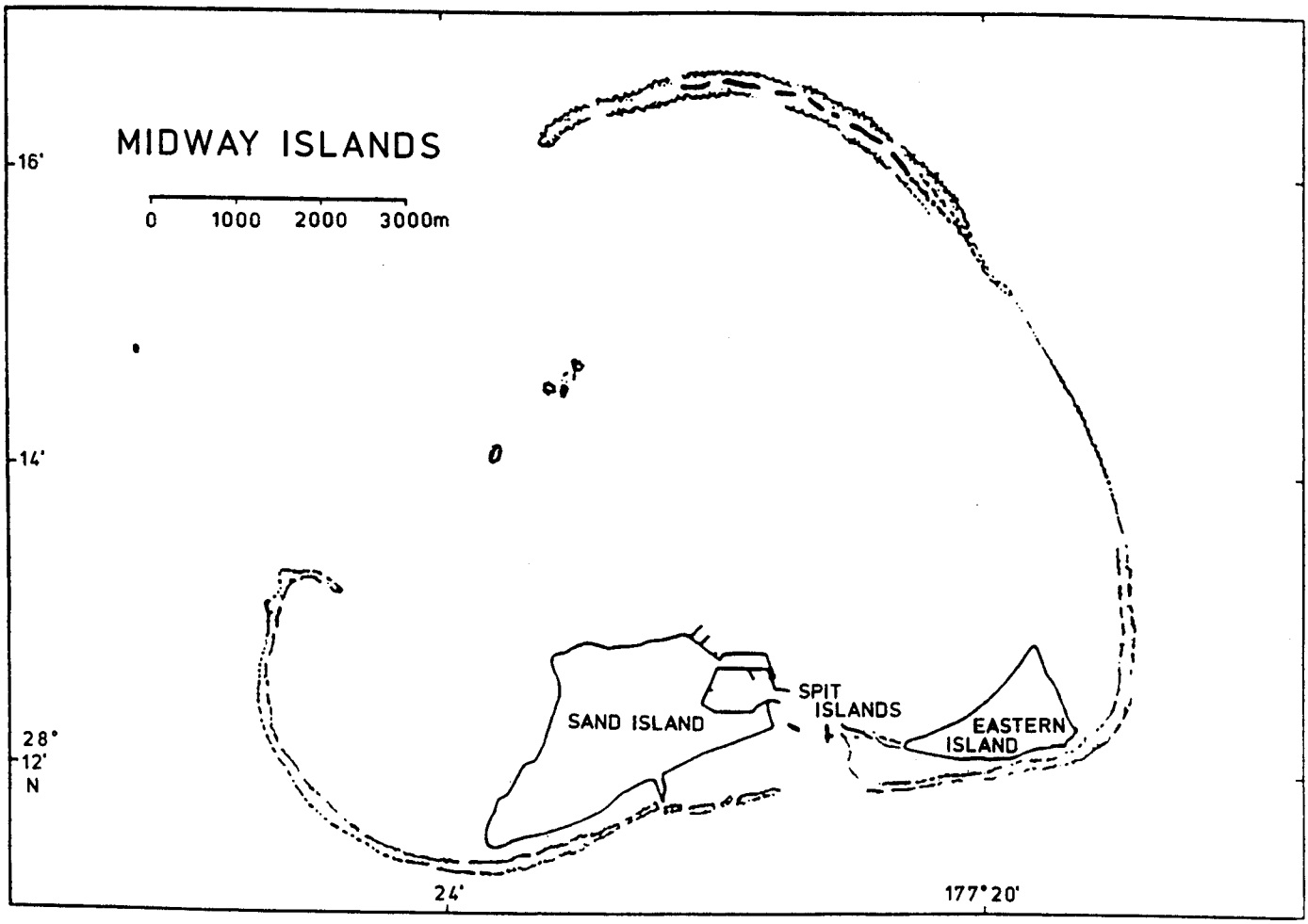

Figure 1.--Midway Islands, Northwestern Hawaiian Islands.

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